

IN THE CLAIMS:

Kindly cancel claims 2 and 3 without prejudice.

Please amend claims 1, 4-15, 17-21, 23 and 25, as follows:

1 1. (Currently amended) A router controlling congestion on links attached to the
2 router, said router comprising:
3 a plurality of ports;
4 a first port of said plurality of ports for receiving a data packet;
5 a second port of said plurality of ports for transmitting said data packet;
6 a receiver to receive an incoming loss report message on said second port;
7 a first processor to determine loss of packets on selected ports of said plurality of
8 ports;
9 a second processor to calculate, in response to said incoming loss report message
10 and said loss of packets, a loss rate statistic;
11 a transmitter to transmit an outgoing loss report message through said first port,
12 said outgoing loss report message containing a field having said loss rate statistic written
13 therein.

1 2. (Canceled)

1 3. (Canceled)

1 4. (Currently amended) The ~~apparatus~~ router as in claim 1 wherein said loss rate
2 statistic is a largest loss rate ~~determined by said router~~ determined in a set of loss rates determined for
3 said selected ports of said plurality of ports.

1 5. (Currently amended) ~~The apparatus as in claim 1~~ A router controlling congestion
2 on links attached to the router, said router comprising:
3 a plurality of ports;
4 a first port of said plurality of ports for receiving a data packet;
5 a second port of said plurality of ports for transmitting said data packet;
6 a receiver to receive an incoming loss report message on said second port;
7 a first processor to determine loss of packets on selected ports of said plurality of
8 ports;
9 a second processor to calculate, in response to said incoming loss report message
10 and said loss of packets, a loss rate statistic;
11 a transmitter to transmit an outgoing loss report message through said first port,
12 said outgoing loss report message containing a field having said loss rate statistic written
13 therein,
14 wherein said loss rate statistic is a time averaged loss rate.

1 6. (Currently amended) ~~The apparatus~~ router of claim 1, further comprising:
2 a linecard supporting at least one of said plurality of ports, said linecard
3 having ~~a linecard~~ said first processor and a memory mounted thereon, said ~~linecard~~ first
4 processor computing said loss of packets.

1 7. (Currently amended) ~~The apparatus~~ router of claim 1, further comprising: said
2 outgoing loss report message is carried in a NAK packet.

1 8. (Currently amended) ~~The apparatus~~ router of claim 1, further comprising: said
2 outgoing loss report message is transmitted by said router in response to the router re-
3 ceiving a loss report message from a downstream router.

1 9. (Currently amended) The apparatus-router of claim 1, further comprising: said
2 outgoing loss report message is transmitted by said router in response to the router re-
3 ceiving a loss report message from a target-downstream receiver station.

1 10. (Currently amended) The apparatus-router of claim 1, further comprising: said
2 outgoing loss report message is periodically transmitted by said router.

1 11. (Currently amended) The apparatus-router of claim 1, further comprising:
2 a central processor (CPU) forwarding engine, said CPU forwarding engine deter-
3 mining which port said outgoing loss report message is to be transmitted ~~out through~~.

1 12. (Currently amended) The apparatus-router as in claim 1, further comprising:
2 a central processor (CPU) control engine, said CPU control engine generating said
3 outgoing loss report message.

1 13. (Currently amended) A method for operating a router, said method comprising:
2 receiving a multicast group data packet at a first port;
3 transmitting a replica of said multicast group data packet from a second port;
4 receiving an incoming loss report message on said second port;
5 computing a loss of packets on selected ports of said router;
6 calculating, in response to said incoming loss report message and said loss of
7 packets, a loss rate statistic;
8 transmitting an outgoing loss report message through said first port, said outgoing
9 loss report message containing said loss rate statistic in a field of said outgoing loss re-
10 port message.

1 14. (Currently amended) The method of claim 13, further comprising:
2 choosing said loss rate statistic as a largest packet loss rate in a set of loss rates
3 computed for said selected ports of said router. ~~determined by said router.~~

1 15. (Currently amended) ~~The method of claim 13, further comprising:~~ A method for
2 operating a router, said method comprising:
3 receiving a multicast group data packet at a first port;
4 transmitting a replica of said multicast group data packet from a second port;
5 receiving an incoming loss report message on said second port;
6 computing a loss of packets on selected ports of said router;
7 calculating, in response to said incoming loss report message and said loss of
8 packets, a loss rate statistic;
9 transmitting an outgoing loss report message through said first port, said outgoing
10 loss report message containing said loss rate statistic in a field of said outgoing loss re-
11 port message; and
12 choosing said loss rate statistic as a time averaged packet loss rate as determined
13 by said router.

1 16. (Original) The method of claim 13, further comprising:
2 selecting said selected ports as members of a multicast group distribution tree.

1 17. (Currently amended) The method of claim 13, further comprising:
2 determining a loss rate statistic which has not expired at ~~"at least one", for at least~~
3 one port of said router, where said at least one port includes all ports of a multicast group
4 distribution tree of said multicast group;
5 writing said loss rate statistic into said outgoing loss report message packet and
6 before transmitting said outgoing loss report packet message.

1 18. (Currently amended) The method of claim 13, further comprising: transmitting
2 said outgoing loss report packet message as a NAK packet.

1 19. (Currently amended) The method of claim 13, further comprising: transmitting
2 said outgoing loss report ~~packet~~message in response to receiving said incoming loss re-
3 port ~~packet~~message.

1 20. (Currently amended) The method of claim 13, further comprising: transmitting
2 said outgoing loss report ~~packet~~message periodically.

1 21. (Currently amended) The method of claim 13, further comprising: transmitting
2 said outgoing loss report message as a unicast message to ~~the~~a next upstream router ca-
3 pable of responding to said outgoing loss report message.

1 22. (Original) The method of claim 13 further comprising: transmitting said out-
2 going loss report message as a multicast message.

1 23. (Currently amended) A router, comprising:
2 means for receiving a multicast group data packet at a first port;
3 means for transmitting a replica of said multicast group data packet from a second
4 port;
5 means for receiving an incoming loss report message on said second port;
6 means for computing a loss of packets on selected ports of said router;
7 means for calculating, in response to said incoming loss report message and said
8 loss of packets, a loss rate statistic;
9 means for transmitting an outgoing loss report message through said first port,
10 said outgoing loss report message containing said loss rate statistic in a field of said out-
11 going loss report message.

1 24. (Original) A computer readable media having instructions written thereon for
2 practicing the method of claim 13.

Ag. Cont.

- 1 ~~24~~ 25. (Currently amended) Electromagnetic signals carried on a computer network,
- 2 said electromagnetic signals carrying instructions for practicing the method of claim 13.

Please add the following new claims 26-*et al.*:

1 26. (New) The router as in claim 1, wherein said outgoing loss report message is re-
2 ceived at a source station of a multicast distribution tree, said source station controlling a
3 transmission rate of data packets transmitted in said multicast distribution tree based on
4 the value of said loss rate statistic stored in said outgoing loss report message.

1 27. (New) The method as in claim 13, further comprising:
2 receiving said outgoing loss report message at a source station of a multicast dis-
3 tribution tree; and
4 controlling, in response to receiving said outgoing loss report message, a trans-
5 mission rate of data packets transmitted by said source station in said multicast distribu-
6 tion tree based on the value of said loss rate statistic stored in said outgoing loss report
7 message.


1 28. (New) The router as in claim 1, wherein said outgoing loss report message is not
2 transmitted by said transmitter if an absolute value of a fractional change of said loss rate
3 statistic, as compared with a previous loss rate statistic, is less than or equal to a prede-
4 termined limit value.

1 29. (New) The method as in claim 13, further comprising:
2 calculating an absolute value of a fractional change of said loss rate statistic as
3 compared with a previous loss rate statistic; and
4 preventing, in response to said calculated absolute value being less than or equal
5 to a predetermined limit value, transmission of said outgoing loss report message.

1 30. (New) The router as in claim 1, wherein said outgoing loss report message stores
2 a lifetime associated with said loss rate statistic, said lifetime indicating a duration of
3 time for which said loss rate statistic is valid.

1 31. (New) The method of claim 13, further comprising:
2 associating with said loss rate statistic a lifetime for aging said loss rate statistic;
3 determining whether said loss rate statistic is valid based on the value of said life-
4 time associated with said loss rate statistic; and
5 writing, in response to determining that said loss rate statistic is valid, said loss
6 rate statistic into said outgoing loss report message before transmitting said outgoing loss
7 report message.

1 32. (New) A router controlling congestion on links attached to the router, said router
2 comprising:
3 a plurality of ports;
4 a first port of said plurality of ports for receiving a data packet;
5 a second port of said plurality of ports for transmitting said data packet;
6 a receiver configured to receive an incoming loss report message on said second
7 port;
8 a processor configured to determine loss of packets on selected ports of said plu-
9 rality of ports, said processor being further configured to calculate, in response to said
10 incoming loss report message and said loss of packets, a loss rate statistic; and
11 a transmitter configured to transmit an outgoing loss report message through said
12 first port, said outgoing loss report message containing a field having said loss rate statis-
13 tic written therein.



1 33. (New) A router controlling congestion on links attached to the router, said router
2 comprising:
3 a plurality of ports;
4 a first port of said plurality of ports for receiving a data packet;
5 a second port of said plurality of ports for transmitting said data packet in a down-
6 stream direction;
7 a processor configured to determine loss of packets on a port of said plurality of
8 ports and, in response to said loss of packets, to calculate a loss rate statistic; and
9 a transmitter configured to transmit an outgoing loss report message through said
10 first port in an upstream direction, said outgoing loss report message containing a field
11 having said loss rate statistic written therein.

1 34. (New) The router as in claim 33, further comprising:
2 a receiver to receive a loss report message on said second port, said loss report
3 travelling in said upstream direction; and
4 said processor to calculate said loss rate statistic in response to said loss of pack-
5 ets and in response to said loss report.

1 35. (New) The router as in claim 33, further comprising:
2 said loss rate statistic is a largest loss rate in a set of loss rates determined for said
3 selected ports of said plurality of ports.

1 36. (New) The router as in claim 33, further comprising:
2 said loss rate statistic is a time averaged loss rate.

1 37. (New) The router of claim 33, further comprising:
2 a linecard supporting at least one of said plurality of ports, said linecard having a
3 linecard processor and a memory mounted thereon, said linecard processor computing
4 said loss of packets.

1 38. (New) The router of claim 33, further comprising:
2 a central processor (CPU) forwarding engine, said CPU forwarding engine deter-
3 mining which port said outgoing loss report message is to be transmitted.

1 39. (New) The router as in claim 33, further comprising:
2 a central processor (CPU) control engine, said CPU control engine generating said
3 outgoing loss report message.

1 40. (New) The router of claim 33, further comprising:
2 said outgoing loss report message is carried in a NAK packet.

1 41. (New) The router of claim 33, further comprising:
2 said outgoing loss report message is transmitted by said router in response to the
3 router receiving a loss report message from a downstream router.

1 42. (New) The router of claim 33, further comprising:
2 said outgoing loss report message is periodically transmitted by said router.

1 43. (New) The router as in claim 33, further comprising:
2 said outgoing loss report message is received at a source station of a multicast
3 distribution tree, said source station controlling a transmission rate of data packets trans-
4 mitted in said multicast distribution tree based on the value of said loss rate statistic
5 stored in said outgoing loss report message.

1 44. (New) The router as in claim 33, further comprising:
2 means for receiving said outgoing loss report message at a source station of a
3 multicast distribution tree; and
4 means for controlling, in response to receiving said outgoing loss report message,
5 a transmission rate of data packets transmitted by said source station in said multicast


6 distribution tree based on the value of said loss rate statistic stored in said outgoing loss
7 report message.

1 45. (New) The router as in claim 33, further comprising:
2 said outgoing loss report message is not transmitted by said transmitter if an ab-
3 solute value of a fractional change of said loss rate statistic, as compared with a previous
4 loss rate statistic, is less than or equal to a predetermined limit value.

1 46. (New) The router as in claim 33, further comprising:
2 said outgoing loss report message stores a lifetime associated with said loss rate
3 statistic, said lifetime indicating a duration of time for which said loss rate statistic is
4 valid.

1 47. (New) A method for operating a router, comprising:
2 receiving a data packet travelling in a downstream direction at a first port;
3 transmitting a replica of said data packet from a second port in said downstream
4 direction;
5 computing a loss of packets on selected ports of said router;
6 calculating, in response to said loss of packets, a loss rate statistic; and
7 transmitting an outgoing loss report message through said first port in an upstream
8 direction, said outgoing loss report message containing said loss rate statistic in a field of
9 said outgoing loss report message.

1 48. (New) The router as in claim 47, further comprising:
2 receiving a loss report message on said second port, said loss report travelling in
3 said upstream direction; and
4 calculating said loss rate statistic in response to said loss of packets and in re-
5 sponse to said loss report.

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- 1 49. (New) The method of claim 47, further comprising:
2 calculating said loss rate statistic as a largest loss rate in a set of loss rates deter-
3 mined for said selected ports of said plurality of ports.
- 1 50. (New) The method of claim 47, further comprising:
2 calculating said loss rate statistic as a time averaged loss rate.
- 1 51. (New) The method of claim 47, further comprising:
2 computing said loss of packets by a processor mounted on a linecard, said line-
3 card supporting at least one of said plurality of ports, said linecard having said linecard
4 processor and a memory mounted thereon.
- 1 52. (New) The method of claim 47, further comprising:
2 determining which port said outgoing loss report message is to be transmitted by a
3 central processor (CPU) forwarding engine.
- 1 53. (New) The method as in claim 47, further comprising:
2 generating said outgoing loss report message by a central processor (CPU) control
3 engine.
- 1 54. (New) The method of claim 47, further comprising:
2 carrying said outgoing loss report message in a NAK packet.
- 1 55. (New) The method of claim 47, further comprising:
2 transmitting said outgoing loss report message by said router in response to the
3 router receiving a loss report message from a downstream router.
- 1 56. (New) The method of claim 47, further comprising:
2 transmitting said outgoing loss report message periodically by said router.

1 57. (New) The method as in claim 47, further comprising:
2 transmitting said outgoing loss report message upstream so that it can be received
3 at a source station of a multicast distribution tree, said source station controlling a trans-
4 mission rate of data packets transmitted in said multicast distribution tree based on the
5 value of said loss rate statistic stored in said outgoing loss report message.

1 58. (New) The method as in claim 47, further comprising:
2 receiving said outgoing loss report message at a source station of a multicast dis-
3 tribution tree; and
4 controlling, in response to receiving said outgoing loss report message, a trans-
5 mission rate of data packets transmitted by said source station in said multicast distribu-
6 tion tree based on the value of said loss rate statistic stored in said outgoing loss report
7 message.

1 59. (New) The method as in claim 47, further comprising:
2 calculating an absolute value of a fractional change of said loss rate statistic as
3 compared with a previous loss rate statistic; and
4 preventing, in response to said calculated absolute value being less than or equal
5 to a predetermined limit value, transmission of said outgoing loss report message.

1 60. (New) The method of claim 47, further comprising:
2 associating with said loss rate statistic a lifetime for aging said loss rate statistic;
3 determining whether said loss rate statistic is valid based on the value of said life-
4 time associated with said loss rate statistic; and
5 writing, in response to determining that said loss rate statistic is valid, said loss
6 rate statistic into said outgoing loss report message before transmitting said outgoing loss
7 report message.

1 61. (New) A router, comprising:
2 means for receiving a data packet travelling in a downstream direction at a first
3 port;
4 means for transmitting a replica of said data packet from a second port in said
5 downstream direction;
6 means for computing a loss of packets on selected ports of said router;
7 means for calculating, in response to said loss of packets, a loss rate statistic;
8 means for transmitting an outgoing loss report message through said first port in
9 an upstream direction, said outgoing loss report message containing said loss rate statistic
10 in a field of said outgoing loss report message.

1 62. (New) The router as in claim 61, further comprising:
2 means for receiving a loss report message on said second port, said loss report
3 travelling in said upstream direction; and
4 means for calculating said loss rate statistic in response to said loss of packets and
5 in response to said loss report.

1 63. (New) The router of claim 61, further comprising:
2 means for calculating said loss rate statistic as a largest loss rate in a set of loss
3 rates determined for said selected ports of said plurality of ports.

1 64. (New) The router of claim 61, further comprising:
2 means for calculating said loss rate statistic as a time averaged loss rate.

1 65. (New) The router of claim 61, further comprising:
2 means for computing said loss of packets by a processor mounted on a linecard,
3 said linecard supporting at least one of said plurality of ports, said linecard having said
4 linecard processor and a memory mounted thereon.

- 1 66. (New) The router of claim 61, further comprising:
2 means for determining which port said outgoing loss report message is to be
3 transmitted by a central processor (CPU) forwarding engine.
- 1 67. (New) The router as in claim 61, further comprising:
2 means for generating said outgoing loss report message by a central processor
3 (CPU) control engine.
- 1 68. (New) The router of claim 61, further comprising:
2 means for carrying said outgoing loss report message in a NAK packet.
- 1 69. (New) The router of claim 61, further comprising:
2 means for transmitting said outgoing loss report message by said router in re-
3 sponse to the router receiving a loss report message from a downstream router.
- 1 70. (New) The router of claim 61, further comprising:
2 means for transmitting said outgoing loss report message periodically by said
3 router.
- 1 71. (New) The router as in claim 61, further comprising:
2 means for transmitting said outgoing loss report message upstream so that it can
3 be received at a source station of a multicast distribution tree, said source station control-
4 ling a transmission rate of data packets transmitted in said multicast distribution tree
5 based on the value of said loss rate statistic stored in said outgoing loss report message.
- 1 72. (New) The router as in claim 61, further comprising:
2 means for receiving said outgoing loss report message at a source station of a
3 multicast distribution tree; and

4 means for controlling, in response to receiving said outgoing loss report message,
5 a transmission rate of data packets transmitted by said source station in said multicast
6 distribution tree based on the value of said loss rate statistic stored in said outgoing loss
7 report message.

1 73. (New) The router as in claim 61, further comprising:

2 means for calculating an absolute value of a fractional change of said loss rate
3 statistic as compared with a previous loss rate statistic; and

4 means for preventing, in response to said calculated absolute value being less than
5 or equal to a predetermined limit value, transmission of said outgoing loss report mes-
6 sage.

1 74. (New) The router of claim 61, further comprising:

2 means for associating with said loss rate statistic a lifetime for aging said loss rate
3 statistic;

4 means for determining whether said loss rate statistic is valid based on the value
5 of said lifetime associated with said loss rate statistic; and

6 means for writing, in response to determining that said loss rate statistic is valid,
7 said loss rate statistic into said outgoing loss report message before transmitting said out-
8 going loss report message.

1 75. (New) A computer readable media, comprising:


2 said computer readable media having instructions written thereon for execution on
3 a processor for the practice of a method of operating a router, the method having the steps
4 of,

5 receiving a multicast group data packet at a first port;

6 transmitting a replica of said multicast group data packet from a second port;

7 receiving an incoming loss report message on said second port;


8 computing a loss of packets on selected ports of said router;
9 calculating, in response to said incoming loss report message and said loss of
10 packets, a loss rate statistic;
11 transmitting an outgoing loss report message through said first port, said outgoing
12 loss report message containing said loss rate statistic in a field of said outgoing loss re-
13 port message.



1 76. (New) Electromagnetic signals propagating on a computer network, comprising:
2 said electromagnetic signals carrying instructions for execution on a processor for
3 the practice of a method of operating a router, the method having the steps of,
4 receiving a multicast group data packet at a first port;
5 transmitting a replica of said multicast group data packet from a second port;
6 receiving an incoming loss report message on said second port;
7 computing a loss of packets on selected ports of said router;
8 calculating, in response to said incoming loss report message and said loss of
9 packets, a loss rate statistic;
10 transmitting an outgoing loss report message through said first port, said outgoing
11 loss report message containing said loss rate statistic in a field of said outgoing loss re-
12 port message.

1 77. (New) A computer readable media, comprising:
2 said computer readable media having instructions written thereon for execution on
3 a processor for the practice of a method of operating a router, the method having the steps
4 of,
5 receiving a data packet travelling in a downstream direction at a first port;
6 transmitting a replica of said data packet from a second port in said downstream
7 direction;

8 computing a loss of packets on selected ports of said router;
9 calculating, in response to said loss of packets, a loss rate statistic; and
10 transmitting an outgoing loss report message through said first port in an upstream
11 direction, said outgoing loss report message containing said loss rate statistic in a field of
12 said outgoing loss report message.



1 78. (New) Electromagnetic signals propagating on a computer network, comprising:
2 said electromagnetic signals carrying instructions for execution on a processor for
3 the practice of a method of operating a router, the method having the steps of,
4 receiving a data packet travelling in a downstream direction at a first port;
5 transmitting a replica of said data packet from a second port in said downstream
6 direction;
7 computing a loss of packets on selected ports of said router;
8 calculating, in response to said loss of packets, a loss rate statistic; and
9 transmitting an outgoing loss report message through said first port in an upstream
10 direction, said outgoing loss report message containing said loss rate statistic in a field of
11 said outgoing loss report message.
